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10/816,762

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Robert J. Drost

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01/25/2006

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EXAMINER

RAHLL, JERRY T

ART UNIT

PAPER NUMBER

2874

DATE MAILED: 01/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--------------------------------------|-------------------------------------|--|
| Office Action Summary | Application No. 10/816,762 | Applicant(s) DROST ET AL. | |
| | Examiner Jerry T. Rahl | Art Unit 2874 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau. (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>4/20/04, 12/13/04, 8/24/05</u> | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statements (IDSs) submitted on 20 April 2004, 13 December 2004, and 24 August 2005 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 3, 6, 9-11, 13, 16, 19, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent No. 5,857,042 to Robertson et al.

4. Regarding Claims 1 and 11, Robertson et al. describes a device for communicating between a first semiconductor die (14) and a second semiconductor dies (15) comprising an electrical-to-optical transducers (16A-16D) configured to convert electrical signals into optical signals (see Column 3) located on a face of the first die and optical-to-electrical transducers (17A-17D) configured to convert optical signals received from the first die into electrical signals (see Column 3) located on a face of the second die, where the first and second dies are oriented face-to-face so that the optical signal from the first die shines on the second die (see Figures 2-3 and Columns 2-4). The method of Claim 1 is embodied in the device described above.

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5. Regarding Claims 3 and 13, Robertson et al. describes lenses (19A-19D) that focus the optical signal on the second die.
6. Regarding Claims 6 and 16, Robertson describes the plurality of signals transmitted parallel from the electrical-to-optical transducers of the first die first die to optical-to-electrical transducers the second die (see Figure 2).
7. Regarding Claims 9 and 19, Robertson et al. describes the electrical-to-optical transducers as VCSELs (23).
8. Regarding Claims 10 and 20, Robertson et al. describes the optical-to-electrical transducers as PIN photo-diodes (see Column 3).
9. Claims 1, 5, 9, 11, 15, and 19 rejected under 35 U.S.C. 102(e) as being anticipated by US Patent Application Publication 2003/0016920 to Sohmura et al.
10. Regarding Claims 1 and 11, Sohmura et al. describes a device for communicating between a first semiconductor die (4) and a second semiconductor dies (4) comprising an electrical-to-optical transducer (5) configured to convert electrical signals into optical signals located on a face of the first die and optical-to-electrical transducers (6) configured to convert optical signals received from the first die into electrical signals located on a face of the second die, where the first and second dies are oriented face-to-face so that the optical signal from the first die shines on the second die (see Figures 1-3 and Paragraphs 63-76) . The method of Claim 1 is embodied in the device described above.
11. Regarding Claims 5 and 15, Sohmura et al. describes an interposer (50) between the first and second dies, where the interposer contains a waveguide that direct the optical signal.

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12. Regarding Claims 9 and 19, Sohmura et al. describes the electrical-to-optical transducer as a LED (see Paragraph 73).

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

15. Claims 2, 7, 8, 12, 17, 18, 21-23, and 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robertson et al.

16. Robertson et al. describes a device for communicating between multiple dies, as discussed above.

17. Regarding Claims 2 and 12, Robertson et al. does not specifically describe annuli in metal layers on the first semiconductor die. However, it is well known in the art that such annular structures are functionally equivalent to the lens structures described by Robertson et al. Therefore, it would have been obvious to one of ordinary skill in the art to use any well-known

equivalent to focus the optical signal in the device described by Robertson. The motivation for doing would have been to increase long-term stability of the structure or to decrease the projection of the focusing means from the die surface.

18. Regarding Claims 7, 8, 17 and 18, Robertson does not specifically describe controlling the transducers to correct mechanical misalignment in X, Y, or Θ coordinates. However, Robertson does describe controlling the transducers to correct for mechanical misalignment in the X coordinates (See Figure 2). However, since the embodiment described in Figure only has single rows of transducers, there would be no reason to control misalignment in Y or Θ coordinates. However, it would have been obvious to one having ordinary skill in the art at the time of the invention to use multiple rows of transducers in the system since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. Once such duplication had been contemplated, control for misalignment in any planar direction would have been obvious to one of ordinary skill in the art to correct for the new degree of possible misalignments.

19. Regarding Claims 21-23 and 26-30, all of the limitations of these claims have been discussed concerning Claims 1-3, 6-13, and 16-20 except for the inclusion of the described device in a computer system. Robertson does not specifically describe the device used in a computer system. However, it is well-known in the art to use optical transmission between chips in computer systems. Therefore, it would have been obvious to one of ordinary skill in the art to use the transducer setup described by Robertson in a computer system to allow for fast, dense communication between chips.

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20. Claims 1, 4-6, 11, 14-16, 21, and 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent Application Publication No. 2003/0039455 to Ouchi in view of Robertson et al.

21. Regarding Claims 1, 11 and 21, Ouchi describes a computer system (see Paragraph 4) having a device for communicating between a first electrical-to-optical semiconductor transducer (1131) to convert electrical signals into optical signals located on a face and a second optical-to-electrical semiconductor transducer (1141) configured to convert optical signals received from the first transducer into electrical signals located on a second face, where the first and second faces are oriented face-to-face so that the optical signal from the first die shines on the second die (see Figure 1 and Paragraphs 6-7).

22. Ouchi does not describe the first and second transducers positioned on separate semiconductor dies.

23. Robertson et al. describes transducers positioned on separate dies, as discussed previously. Ouchi and Robertson et al. are analogous art form the same field of endeavor of optical communications between electrical circuits. At the time of invention, it would have been obvious to one of ordinary skill in the art to use the transducer set up of Ouchi with the separate die structure of Robertson et al. The motivation for doing so would have been to allow for optical connection between electrical circuits that are not coplanar. Therefore, it would have been obvious to one of ordinary skill in the art to combine Robertson et al. with Ouchi to obtain the invention as specified in the present claims.

24. The method of Claim 1 is embodied in the device described above.

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25. Regarding Claims 4, 14, and 24, Ouchi describes a mirror (1133s) reflecting the optical signal and the transducers being perpendicular to each other (see Figure 1).

26. Regarding Claims 5, 15 and 25, Ouchi describes an interposer (1101) containing plural waveguides sandwiched between the transducers.

27. Regarding Claims 6, 16 and 26, Ouchi describes multiple first and second transducers and multiple optical signals transmitted parallel to each other.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jerry T. Rahll whose telephone number is (571) 272-2356. The examiner can normally be reached on M-Th (8:30-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jerry T Rahll



MICHELLE CONNELLY-CUSHWA
PRIMARY EXAMINER
12/6/05